

Claims

- [c1] 1. A resistor structure, comprising:
an electrically conducting region;
a liner region coupled to the electrically conducting region; and
first and second contact regions electrically coupled to the electrically conducting region and the liner region, wherein in response to a current flowing in the electrically conducting region and from the first contact region to the second contact region, a void region in the electrically conducting region expands due to electromigration so as to increase the resistance of the resistor structure between the first and second contact regions.
- [c2] 2. The resistor structure of claim 1,
wherein the electrically conducting region is surrounded by the liner region, and
wherein both the electrically conducting region and the liner region are in direct physical contact with the second contact region.
- [c3] 3. The resistor structure of claim 1,
wherein the current comprises flowing electrons, and
wherein the void region expands in the direction of the

flow of the electrons.

- [c4] 4. The resistor structure of claim 1, wherein the electrically conducting region comprises a first plate, wherein the liner region comprises second and third plates, wherein the first plate is sandwiched between the second and third plate, and wherein the second plate is in direct physical contact with both the first and second contact regions.
- [c5] 5. The resistor structure of claim 1, wherein the electrically conducting region comprises first and second portions, and wherein in response to the current, electromigration occurs in the first portion but not in the second portion.
- [c6] 6. The resistor structure of claim 5, wherein in response to the current, the void region expands and replaces the entire first portion of the electrically conducting region.
- [c7] 7. The resistor structure of claim 1, wherein the void region expands and replaces the entire the electrically conducting region.
- [c8] 8. The resistor structure of claim 1, wherein the electrically conducting region comprises a material selected from the group consisting of copper and a silicide.

- [c9] 9. A method for tuning a resistor structure, the method comprising the steps of:
providing (a) an electrically conducting region, (b) a liner region coupled to the electrically conducting region, and (c) first and second contact regions electrically coupled to the electrically conducting region and a liner region;
and
flowing a current in the electrically conducting region and from the first contact region to the second contact region such that a void region in the electrically conducting region expands due to electromigration so as to increase the resistance of the resistor structure between the first and second contact regions.
- [c10] 10. The method of claim 9, wherein the electrically conducting region is surrounded by the liner region, and wherein both the electrically conducting region and the liner region are in direct physical contact with the second contact region.
- [c11] 11. The method of claim 9, wherein the current comprises flowing electrons, and wherein the void region expands in the direction of the flow of the electrons.
- [c12] 12. The method of claim 9, wherein the electrically conducting region comprises a first plate, wherein the liner region comprises second and third plate, wherein the

first plate is sandwiched between the second and third plate, and wherein the second plate is in direct physical contact with both the first and second contact regions.

[c13] 13. The method of claim 9, wherein the electrically conducting region comprises first and second portions, and wherein in response to the current, electromigration occurs in the first portion but not in the second portion.

[c14] 14. The method of claim 13, wherein in response to the current, the void region expands and replaces the entire first portion of the electrically conducting region.

[c15] 15. The method of claim 9, wherein the void region expands and replaces the entire the electrically conducting region.

[c16] 16. The method of claim 9, wherein the electrically conducting region comprises a material selected from the group consisting of copper and a silicide.

[c17] 17. The method of claim 9, further comprising the step of disabling the current when the resistance of the resistor structure between the first and second contact regions is within a pre-determined tolerance of a pre-specified target resistance value.

[c18] 18. A method for tuning a resistor structure, the method

comprising the steps of:

providing in the resistor structure (a) a semiconductor region, (b) an electrically conducting layer formed on the semiconductor region, (c) a plurality of contact regions electrically coupled to the electrically conducting layer; selecting first and second contact regions of the plurality of contact regions such that if intervals of the electrically conducting layer between the first and second contact regions are replaced by a void region due to electromigration, the resistance of the resistor structure between third and fourth contact regions of the plurality of contact regions is within a pre-determined tolerance of a pre-specified target resistance value; and applying a voltage difference between the first and second contact regions until the intervals of the electrically conducting layer between the first and second contact regions are replaced by the void region due to electromigration.

[c19] 19. The method of claim 18, wherein the electrically conducting layer comprises a silicide material.

[c20] 20. The method of claim 18, wherein the electrically conducting layer comprises first and second layer sections physically separated by the semiconductor region, and wherein the first and second layer sections are in direct physical contact with the third and fourth contact

regions, respectively.